UNITED STATES PATENT AND TRADEMARK OFFICE

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10/666,691	09/18/2003	Donghui Wu	ARC-P127	1403

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EXAMINER
PATEL, JAYESH A

ART UNIT	PAPER NUMBER
2624	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/12/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 September 2003*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *13-18* is/are allowed.

6)☒ Claim(s) *1-5 and 8* is/are rejected.

7)☒ Claim(s) *6,7,9-12* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set
forth in section 102 of this title, if the differences between the subject matter sought to be patented and
the prior art are such that the subject matter as a whole would have been obvious at the time the
invention was made to a person having ordinary skill in the art to which said subject matter pertains.
Patentability shall not be negatived by the manner in which the invention was made.

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over

John (GB 2316255) hereafter John in view of Camus (US 6516087) hereafter

Camus.

1. Regarding Claim 1, John discloses a method for aligning a first image and a

second image in **(Fig 1 and 2)** comprising: (1) selecting a first pixel in the first

image **(Page 4 Lines 20-21)** and a second pixel in the second image **(Page 4**

Lines 23-24) that overlap when the first image and the second image are aligned

with a camera motion at **(Page 5 Lines 1-5 and Lines 13-17)**.

John discloses stabilizing the images captured by moving Camera at

(Page 1 Lines 1-10). John however does not disclose (2) if the first and the

second pixels are edge pixels, incrementing a correlation value between the first

image and the second image for the camera motion; (3) if only one of the first

and the second pixels is an edge pixel, decrementing the correlation value

between the first image and the second image for the camera motion; (4)

repeating steps (1) to (3) for other overlapping pixels in the first image and the

second image to determine the correlation value between the first image and the

second image for the camera motion.

Camus discloses (2) If the first and the second pixels are edge pixels at

(Col 3 Lines 1-5), incrementing a correlation value between the first image and

the second image at **(Col 3 Lines 8-9)**; (3) if only one of the first and the second

pixels is an edge pixel, decrementing the correlation value between the first

image and the second image at **(Col 3 Lines 10-20)**; (4) repeating steps (1) to

(3) for other overlapping pixels in the first image and the second image to

determine the correlation value between the first image and the second image at

(Col 2 Lines 1-5). John discloses an image stabilizer for the camera **(Page 4**

Lines 14-15) and Camus discloses selecting for each pixel in the **non-shifted**

(stabilized) reference image, the overlap image having the highest correlation

value as the best match at **(Col 3 Lines47-50)**. The more stabilized the image is,

the better the correlation is. Therefore it would have been obvious, for one of

ordinary skill in the art at the time the invention was made, to Stabilize the

Camera as taught by John in the method of real time correlation of stereo images

as taught by Camus.

2. Regarding Claim 2, John and Camus discloses the method of claim 1. John

further discloses wherein the camera motion includes a translation and a rotation

on **(Page 1 Lines 5-8)**.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over John,

Camus in Further view of Lee (US 5694487) hereafter Lee.

3. Regarding Claim 3, John and Camus discloses all the limitations of Claim 1.

John and Camus, however do not disclose the method of claim 1, further

comprising determining if the first and the second pixels are edge pixels, said

determining comprising: applying an edge detection filter to the first pixel to

generate a first result; comparing the first result to a first threshold, wherein the

first pixel is an edge pixel when the first result is greater than the first threshold;

applying the edge detection filter to the second pixel to generate a second result;

and comparing the second result to a second threshold, wherein the second pixel

is an edge pixel when the second result is greater than the second threshold.

Lee discloses applying an edge detection filter to the first pixel to generate

a first result at **(Col 4 Lines 14-18)**; comparing the first result to a first threshold,

wherein the first pixel is an edge pixel when the first result is greater than the first

threshold at **(Col 4 Lines 14-18)**; applying the edge detection filter to the second

pixel to generate a second result at **(Col 4 Lines 14-18)**; and comparing the

second result to a second threshold, wherein the second pixel is an edge pixel

when the second result is greater than the second threshold at **(Col 4 Lines 14-

18)**. The concept of Lee can be expanded for multiple images. Lee further

discloses the edge detection method on each pixel **(pixel by pixel approach)**

allows a more exact estimation and has the ability to handle scale changes at

(Col 1 Lines 64-67). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to use the teachings of Lee in the system and method of Camus for the above reasons. The first and second thresholds are mere values and are applied on separate images and are not used together at the same time.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over John, Camus, Lee and in further view of Fujieda (US 20020063893) hereafter Fujieda.

4. Regarding Claim 4, Camus and Lee discloses all the limitations of Claim 3. Camus and Lee however do not disclose the edge detection filter is a Sobel filter defined as: $g.sub.x(x,y)=I(x+1,y-1)+2I(x+1,y)+I(x+1,y+1)-I(x-1,y-1)-2I(x-1,y)-I(x-1,y+1)$; $g.sub.y(x,y)=I(x-1,y+1)+2I(x,y+1)+I(x+1,y+1)-I(x-1,y-1)-2I(x,y-1)-I(x+1,y-1)$; $G(x,y)=.vertline.g.sub.x(x,y).vertline.+.vertl-ine.g.sub.y(x,y).vertline.$; wherein g.sub.x is a Sobel gradient in the x-direction, g.sub.y is a Sobel gradient in the y-direction, G is a Sobel gradient in the x-direction and the y-direction, and I is a pixel value.

Fujieda discloses a Sobel filter on **(Page 3 Para 0025)** defined as $E.sub.x(x,y)=I(x+1,y-1)+2I(x+1,y)+I(x+1,y+1)-I(x-1,y-1)-2I(x-1,y)-I(x-1,y+1)$; $E.sub.y(x,y)=I(x-1,y+1)+2I(x,y+1)+I(x+1,y+1)-I(x-1,y-1)-2I(x,y-1)-I(x+1,y-1)$; $Ei(x,y)=.vertline.E.sub.x(x,y).vertline.+.vertl-ine.E.sub.y(x,y).vertline.$; wherein E.sub.x is a Sobel gradient in the x-direction, E.sub.y is a Sobel gradient in the y-

direction, Ei is a Sobel gradient in the x-direction and the y-direction, and I is a

pixel value on **(Page 4 Para 0052,0053 and 0054)**. Therefore it would have been

obvious for one of ordinary skill in the art at the time the invention was made to

have used the Sobel filter **(Page 3 Para 0025)** for detection of edge pixels as

explained on **(Page 1 Para 0010)**.

Claims 5 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over

John, Camus and in further view of Yoshida (US 5065440) hereafter Yoshida.

5. Regarding Claim 5, John and Camus discloses the method of claim 1.Camus

and John however do not disclose wherein said incrementing a correlation value

between the first image and the second image for the camera motion comprises:

determining an edge orientation matching value representing how closely the first

pixel and the second pixel match in edge orientation; and incrementing the

numerator of the correlation value by the edge orientation matching value.

Yoshida discloses incrementing a correlation value between the first

image and the second image for the camera motion comprises: determining an

edge orientation matching value at **(Col 1 Lines 51-55 and Col 4 Lines 48-55)**

representing how closely the first pixel and the second pixel match in edge

orientation **(Col 4 Line 60-61)**; and incrementing the numerator at **(Col 4 Line

58)** of the correlation value by the edge orientation matching value at **(Col 3**

Lines 53-55 and Lines 60-61). Prior to obtaining the correlation value Yoshida

obtains positional information **(orientation)** using pattern contour **(edge)**. The

pattern recognition apparatus as taught by Yoshida speeds up the recognition

process by reducing the matching iterations **(Col 2 Lines 55-57)**. Therefore it

would have been obvious for one of ordinary skill in the art to use the teachings

of Yoshida in the method of Camus for the above reasons.

6. Regarding Claim 8, John and Camus disclose the method of claim 1. John and

Camus however do not disclose decrementing the correlation value at between

the first image and the second image for the camera motion comprises

decrementing the numerator of the correlation value and incrementing the

denominator of the correlation value.

Yoshida discloses the correlation value ratio at **(Col 4 Lines 53-55)**.

Yoshida also discloses decrementing the correlation value between the first

image and the second image at **(Col 1 Lines 33-35)** for the camera motion

comprises decrementing the numerator at **(Col 1 Lines 31-32)** of the correlation

value and incrementing the denominator of the correlation value at **(Col 1 Lines**

32-33). The result of increasing the denominator (the number of unmatched

pixels) and decreasing the numerator value (the number of matched pixels)

would recognize errors in pattern matching **(Col 1 Lines 35-37)** and hence

speeds up the recognition process **(Col 2 Lines 55-57)**. Therefore it would have

been obvious for one of ordinary skill in the art, at the time the invention was

made, to use the apparatus and teachings of Yoshida for real time correlation of

images and stabilization as taught by Camus and John.

Allowable Subject Matter

Claims 6,7,9-12 are objected to as being dependent upon a rejected base claim,

but would be allowable if rewritten in independent form including all of the

limitations of the base claim and any intervening claims.

Claims 13-18 are allowable.

Conclusion

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Jayesh A. Patel whose telephone number is 571-

270-1227. The examiner can normally be reached on M-F 7.00am to 4.30 pm (5-

4-9).If attempts to reach the examiner by telephone are unsuccessful, the

examiner's supervisor, Jingge Wu can be reached on 571-272-7429. The fax

phone number for the organization where this application or proceeding is
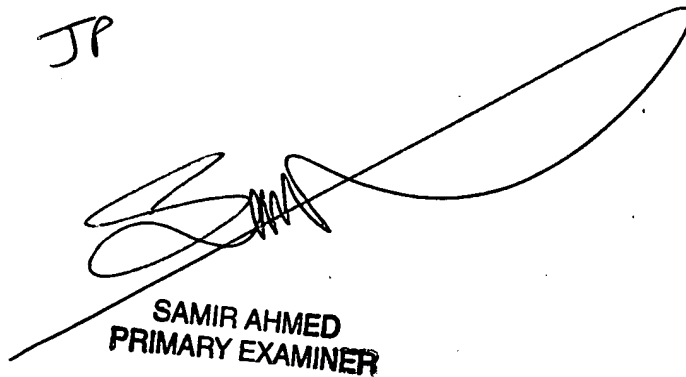
assigned is 571-273-8300.

Information regarding the status of an application may be obtained from

the Patent Application Information Retrieval (PAIR) system. Status information

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direct.uspto.gov. Should you have questions on access to the Private PAIR

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free). If you would like assistance from a USPTO Customer Service

Representative or access to the automated information system, call 800-786-

9199 (IN USA OR CANADA) or 571-272-1000.

Jayesh Patel
2/126/07

SAMIR AHMED
PRIMARY EXAMINER